SECTION 319 NONPOINT SOURCE POLLUTION CONTROL PROGRAM
WATERSHED PROJECT FINAL REPORT

MEDICINE LODGE CREEK SUBBASIN
TOTAL MAXIMUM DAILY LOAD
IMPLEMENTATION PROJECT
GRANT #S051

BY

CLARK SOIL CONSERVATION DISTRICT

FEBRUARY 2007

THIS PROJECT WAS CONDUCTED IN COOPERATION WITH THE LANDOWNERS, FARMERS, AND RANCHERS IN THE MEDICINE LODGE CREEK SUBBASIN AND THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY, IDAHO ASSOCIATION OF SOIL CONSERVATION DISTRICTS, IDAHO SOIL CONSERVATION COMMISSION, UNITED STATES DEPARTMENT OF AGRICULTURE-NATURAL RESOURCE CONSERVATION SERVICE, AND THE IDAHO STATE DEPARTMENT OF AGRICULTURE.

EXECUTIVE SUMMARY

Project Title – Medicine Lodge Creek TMDL Implementation Project

Project Start Date – April 2002 **Project Completion Date** – February 2007

Funding

Total Budget – $815,357

Total EPA Grant – $485,188

Total Expenditures of EPA Funds – $354,843

Total Section §319 Match Accrued – $420,440

Total Expenditures – $1,304,527

Summary Accomplishments – The Medicine Lodge TMDL Implementation Project's goal was to restore cold-water biota and salmonid spawning beneficial uses in streams on private agricultural lands. In order to achieve this goal, BMPs were installed along 27 miles of Medicine Lodge, Irving, and Middle creeks (Figure 4). The project reduced streambank erosion by 40% on 22 stream reaches. The project saved an estimated 1,195 tons per year of sediment from channel erosion (Table 4).

BMPs Installed – Below are the types of BMPs installed during the Medicine Lodge TMDL Project.

Animal Trails & Walkways
Diversion
Fence
Heavy Use Protection
Irrigation Pipeline
Irrigation Sprinkler System
Pasture & Hayland Planting
Pest Management
Livestock Water Pipeline
Riparian Forest Buffer
Streambank Protection
Structure for Water Control
Tree & Shrub Establishment
Upland Wildlife Habitat Management
Use Exclusion
Waste Storage Facility
Watering Facility

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ACKNOWLEDGEMENTS

The Clark SCD would like to thank all of those people who were involved in the Medicine Lodge project. A special thanks to the landowners, farmers, ranchers, and residents for their cooperation and hard work which made this project a success. Additionally, we appreciate the expertise and assistance from all the local, state, and federal employees who participated throughout the project.

Most importantly, we would like to thank Robert Lehman, NRCS Area Engineer, Cleve Bagley, NRCS Soil Conservation Technician, and Lloyd Bradshaw. Over the years, Bob, Cleve, and Lloyd's effort, kind nature, and quiet resolve kept this project moving forward and ensured its success.

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INTRODUCTION

Project Setting – The Medicine Lodge Creek Subbasin (HUC 17040215) is located in northwestern Clark County near the Montana-Idaho border and is 15 miles west of Dubois, Idaho. The subbasin covers 872 square miles or 558,120 acres. Over two-thirds (68%) of the subbasin is public land while private land covers almost one-third (32%). Three-quarters (75%) of the landuse is rangeland whereas nearly one-quarter (23%) of the subbasin is irrigated cropland. Elevations range from 9,000 feet at Fritz Peak to 5,000 feet where Medicine Lodge Creeks disappears into the ground (Traher, 2002).

The subbasin, shown in Figure 1, is a semi-arid steppe with many miles of ephemeral and intermittent drainages. Streams include flow from natural steady thermal springs and snowmelt runoff directly from the Beaverhead Mountain Range. Medicine Lodge Creek begins at the confluence of Warm and Fritz creeks and then flows almost 21 miles in a southeasterly direction past the town of Small, Idaho. The creek then dissipates from diversions and naturally sinks into the channel bed directly above the Eastern Snake River Plain (ESRP) aquifer northwest of Cedar Butte (BLM, 2001).

Beneficial Uses – Medicine Lodge Creek's designated beneficial uses include salmonid spawning, coldwater biota, primary contact recreation, domestic water supply and special resource water. Edie Creek, Irving Creek and Fritz Creek are all protected for cold water, salmonid spawning and secondary contact recreation. Warm Springs Creek does not have any designated beneficial uses. IDEQ assessments identified water quality is limited on five streams in the subbasin (IDEQ, 2003).

TMDL – The Medicine Lodge Creek TMDL was written by the IDEQ in February 2003 and approved by EPA in May 2003. Sediment and temperature are the primary pollutants of concern. IDEQ (2003) developed TMDLs for sediment for Medicine Lodge, Fritz, and Irving creeks.

Sediment reductions were estimated from streambank condition inventories. Water quality targets for percent depth fines of less than 28% (<6.35mm), are consistent with values measured and set by local land management agencies based on established literature values and incorporate a more than adequate level of fry survival to provide for stable salmonid production. It is assumed that the status of beneficial uses will be improved prior to the attainment of the targets of 80 % erosion rates and less than 28% depth fines in this TMDL (IDEQ, 2003).

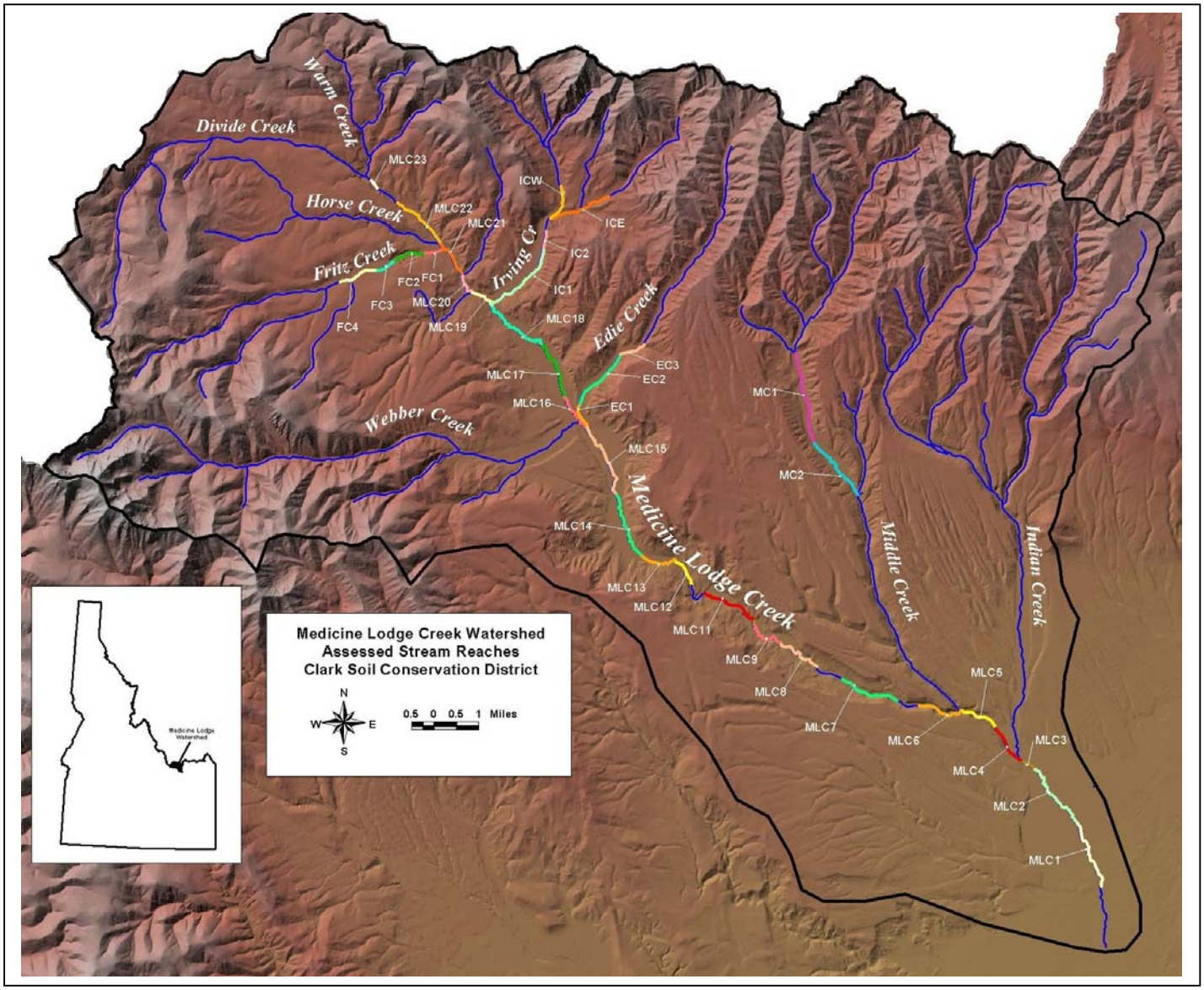
IDEQ (2003) developed temperature TMDLs for all streams that support salmonid spawning and cold water aquatic life. However, no nutrient TMDLs were written for the streams in the subbasin since there was no observational or collected data indicating nutrient enrichment in any part of the subbasin.

Purpose – The purpose of the Medicine Lodge Subbasin TMDL Implementation Project was to restore beneficial uses on 35 miles of streams in the subbasin. The Clark SCD in cooperation with the Continental Divide Watershed Advisory Group (WAG), several state and federal agencies, landowners, farmers, and ranchers implemented this project as part of the Medicine Lodge Creek Subbasin TMDL Implementation Plan for Agriculture.

Table 1. Pollutant Targets for Streams in the Medicine Lodge Creek Subbasin

Pollutant of Concern	Pollutant Targets for Medicine Lodge Creek TMDL
Streambank Stability	Greater than or equal to 80%
Depth Fines	Not to exceed 28% (<6.35 mm)
Temperature (salmonid spawning)	Not to exceed 13°C (May - June 30, Sept. 15-Nov. 15)
Temperature (cold water aquatic life)	Not to exceed 22°C (June 22 - Sept. 21)

Figure 1. Map of the Medicine Lodge Creek TMDL Implementation Project



Project Description – The Clark SCD provided financial and technical assistance to project participants. The project enabled the participants to improve water quality and to restore beneficial uses on Medicine Lodge, Edie, Fritz, Middle, and Irving creeks. This project complemented Clark SCD's five-year Resource Conservation Plan and built upon their past water quality management efforts.

The Clark SCD combined funds from Idaho's Nonpoint Source Grant Program (§319), Idaho's Water Quality Program for Agriculture (WQPA), Farm Service Agency's Continuous sign-up Conservation Reserve Program (CCRP), and Natural Resources Conservation Service's (NRCS) Environmental Quality Incentives Program (EQIP) to implement BMPs in the subbasin. This project provided the necessary financial incentives for landowners, residents, farmers, and ranchers to restore beneficial uses on these impaired streams. Additionally, the Clark SCD spearheaded a coordinated effort with the Continental WAG and other agencies to provide on-site technical assistance to participants.

Phase 1 – In 1999, the Clark SCD and the Continental WAG began collaborating about watershed concerns in the Medicine Lodge subbasin. From June to August 2000, Clark SCD, NRCS, ISCC, IDEQ, and IASCD assessed 38 miles of stream channel on §303(d) listed stream segments of Medicine Lodge, Edie, Fritz, and Irving creeks.

In 2001, the Clark SCD submitted the Phase 1 Project proposal to the ISCC for consideration. The project replaced seven deficient diversions on Medicine Lodge Creek and Irving Creek. These diversions were inadequate due to poor construction, failures from high flows, and were fish passage barriers. The Clark SCD and the Continental Divide WAG made diversion replacement their top priority for BMP implementation. The Phase 1 Project had direct positive effects on water quality, aquatic habitat, irrigation efficiency, fish passage, and stream channel stability.

Phase 2 – In 2002, the Clark SCD, the Continental WAG, NRCS, and IASCD completed the Medicine Lodge Creek Subbasin TMDL Implementation Plan for Agriculture (Traher, 2002). Also that year, the Clark SCD received an Idaho Nonpoint Source Grant totaling more than $485,000 to install BMPs to treat about 35 miles of stream and over 1,500 acres of riparian areas in the subbasin.

In 2003, the Clark SCD initiated a project with the IASCD and ISDA to begin monitoring at five sites in the Medicine Lodge subbasin and continued through 2004. Medicine Lodge Creek is the primary stream in the subbasin and begins at the confluence of Warm and Fritz creeks. The project provided water quality data to the District which identified potential sources and quantified pollutant amounts in the tributaries (Jenkins, 2005). The data was used to guide BMP implementation throughout the subbasin.

Phase 3 – The final phase of the project will evaluate the project's effectiveness, assess on-site BMP effectiveness, and evaluate beneficial use status. This final phase will be completed by 2009.

PROJECT GOALS, OBJECTIVES, AND ACTIVITIES

The goal of this Medicine Lodge Subbasin TMDL Implementation Project was to restore cold-water biota and salmonid spawning beneficial uses on 35 miles of stream. The project will achieve this by:

- ➔ Improving riparian and stream channel habitat
- ➔ Reducing streambank and stream channel erosion
- ➔ Improving grazing management with planned grazing, pasture or exclusion fencing
- ➔ Decreasing sediment, nutrient and bacteria concentrations
- ➔ Reducing livestock concentration on streams with off-stream water developments
- ➔ Buffering streams with grass, shrubs and trees
- ➔ Stabilizing eroding streambanks and channels using stream re-naturalization techniques
- ➔ Monitoring project progress and applying adaptive management

The objective of this project is to apply structural BMPs and restoration measures on Medicine Lodge Creek and its tributaries. Traher (2002) estimated the sediment reduction would be 1,229 tons per year of sediment from channel erosion on 35 miles of Medicine Lodge, Irving, Fritz, and Edie creeks.

Table 2. Pre-Project Estimated Sediment Loads in the Medicine Lodge Subbasin

Sediment Sources	Reaches	Current Yield to River (tons/year)	Target Yield to River (tons/yr)	Reduction (tons/year)	Estimated Reduction (%)
Treatment Unit #1 Middle Mainstem	MLC9, MLC11, MLC14	**591**	**233**	**358**	**61%**
Treatment Unit #2 Lower Tributaries	MLC17, MLC18, MLC21, I1	**813**	**285**	**528**	**65%**
Treatment Unit #3 Tributaries	MLC23, F2, E1, IE, I2	**208**	**150**	**58**	**28%**
Treatment Unit #4 Lower Mainstem	MLC1, MLC2, MLC3	**258**	**171**	**87**	**34%**
Treatment Unit #5 Upper Mainstem	MLC12, MLC13, MLC15, MLC16, MLC19, MLC20	**391**	**284**	**107**	**27%**
Treatment Unit #6 Upper Tributaries	MLC22, F3, F4	**71**	**65**	**6**	**8%**
Treatment Unit #7 Mainstem	MLC4, MLC5, MLC6, MLC7, MLC8	**341**	**256**	**85**	**25%**
Treatment Unit #8 Lower Fritz Creek	F1	**6**	**5**	**1**	**17%**
Treatment Unit #9 Middle Creek	MC1, MC2	**276***	**175***	**101**	**37%**
Estimated Total Sediment Loads		**2,955**	**1,624**	**1,331**	**45%**

* Note – Prior sediment load was estimated in 2006

MILESTONES, PRODUCTS, AND COMPLETION DATES

The project tasks were completed within five years of starting grant (#S051) agreement. Overall, the project will take ten years to finish. The only task left to complete is the BMP effectiveness evaluation with water quality sampling and beneficial use analysis. We anticipate this will be completed by 2009.

Table 3. Tasks, Activities, Outputs, and Milestones for the Medicine Lodge Creek Project

Task 1 Inventory Subbasin Resources	Activities	Conduct geomorphic characterizations Assess proper functioning conditions Survey channel geometry cross-sections Analyze peak, daily and monthly stream flows Establish pre-project monitoring sites	**July 2002**
	Output	Complete Areawide TMDL implementation plan report	
	Milestone	Complete Plan of Work and Implementation Plan by May 2002	
Task 2 Develop Participant Agreements	Activities	Provide site-specific plans for implementing BMPs Contact interested potential participants in the project area Develop contracts for schedule, operation and maintenance, and reimbursement	**February 2006**
	Output	Complete participant plans and contracts with landowners Approve contracts and obligate project funds	
	Milestone	90% of riparian acres planned and contracted by October 1, 2004	
Task 3 Design BMPs and Secure Permits	Activities	Complete final BMP designs and review with project participants Secure permits from appropriate agencies for restoration activities	**April 2006**
	Output	Complete designs with approval from NRCS, participants, and permit agencies	
	Milestone	Complete BMP designs and secure permits within one year of contract approval	
Task 4 Install BMPs	Activities	Implement participant agreements Install BMPs and restoration measures Certify the BMPs in accordance with approved designs Review any modifications by the SCD Commit to operate and maintain the item for the life span of the BMP	**January 2007**
	Output	Certify installation and application of approved BMP and restoration designs	
	Milestone	Complete and certify BMP installations within 3 years of contract approval	
Task 5 Administer Project	Activities	Coordinate project activities with all agencies and participants Report progress semi-annually to sponsoring agencies	**February 2007**
	Output	Allocate funds in accordance with program guidelines and procedures	
	Milestone	Prepare project billings and payment applications Audits financial recordkeeping and accounts Submit semi-annual progress reports and final report	
Task 6 Evaluate Effectiveness	Activities	Survey channel cross-sections Monitor photo points on project sites Sample water quality parameters at monitoring sites	**January 2009**
	Output	Complete monitoring report with effectiveness data and water quality data	
	Milestone	Completed project final report by October 1, 2005	

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PROJECT GOAL ACHIEVEMENT

Project Goal – The goal of this Medicine Lodge Subbasin TMDL Implementation Project was to restore cold-water biota and salmonid spawning beneficial uses on 35 miles of stream. The objective of this project was to apply structural BMPs and restoration measures on Medicine Lodge Creek and its tributaries. Traher (2002) estimated the sediment reduction would be 1,229 tons per year of sediment from channel erosion on 35 miles of Medicine Lodge, Irving, Fritz, and Edie creeks.

Project Accomplishments – The project reduced streambank erosion by 40% on 22 stream reaches (Table 4). Overall, the project treated 27 miles of Medicine Lodge, Irving, and Middle creeks. The project saved an estimated 1,195 tons per year of sediment from channel erosion. This is 97% of the project's proposed sediment reduction goal. There were 10 reaches on almost 12 miles of creeks that were not treated during this project (EC1, FC1, FC2, FC3, FC4, MLC3, MLC4, MLC5, MLC6, MLC7).

Table 4. 2006 Estimated Sediment Reductions in the Medicine Lodge Creek Subbasin

Sediment Sources	Reaches	2002 Sediment Yield to River (tons/year)	2002 Target Yield to River (tons/yr)	2006 Sediment Yield to River (tons/year)	2006 Estimated Reduction (%)
Treatment Unit #1 Middle Mainstem	MLC9, MLC11, MLC14	**591**	**233**	**236**	**60%**
Treatment Unit #2 Lower Tributaries	MLC17, MLC18, MLC21, I1	**813**	**285**	**275**	**66%**
Treatment Unit #3 Tributaries	MLC23, F2, E1, IE, I2	**208**	**150**	**146**	**30%**
Treatment Unit #4 Lower Mainstem	MLC1, MLC2, MLC3	**258**	**171**	**219**	**15%**
Treatment Unit #5 Upper Mainstem	MLC12, MLC13, MLC15, MLC16, MLC19, MLC20	**391**	**284**	**276**	**29%**
Treatment Unit #6 Upper Tributaries	MLC22, F3, F4	**71**	**65**	**54**	**24%**
Treatment Unit #7 Mainstem	MLC4, MLC5, MLC6, MLC7, MLC8	**341**	**256**	**330**	**3%**
Treatment Unit #8 Lower Fritz Creek	F1	**6**	**5**	**6**	**0%**
Treatment Unit #9 Middle Creek	MC1, MC2	**276***	**175***	**218**	**21%**
Estimated Total Sediment Loads		**2,955**	**1,624**	**1,760**	**40%**

* Note – Prior sediment load was estimated in 2006

Figure 2. The top photo is the degraded condition of the riparian area along Medicine Lodge Creek in 2000. The bottom photo is the improved condition of the site in 2003.

RELATIONSHIP TO IDAHO'S NONPOINT SOURCE PLAN

Idaho's Nonpoint Source Plan – This project was a collaborative watershed effort among local, state, federal and private stakeholders to restore beneficial uses impaired by nonpoint source pollution. The project emphasized and installed BMPs identified in the Medicine Lodge Creek TMDL Implementation for Agriculture (Traher, 2002) in accordance with problems identified in the IDEQ (2003) Medicine Lodge Creek Subbasin Assessment and TMDLs. The

Priority – The subbasin was scheduled for TMDL development in 2004. However, the Clark SCD took a proactive approach along with the Continental Divide WAG, and the IDEQ to address water quality problems. Extensive inventories were completed to develop the TMDL earlier than expected. Consequently, the subbasin assessment, TMDLs, and implementation plans were finished in 2003; one year ahead of schedule. This streamlined process was highlighted nationally (Virginia Tech, 2006).

The project achieved several nonpoint source program activities including:

- ➔ Generated substantial interest among local landowners, residents, elected officials and agency personnel
- ➔ Developed informational, educational and marketing materials to target project participants
- ➔ Held public meetings for landowners, farmers, ranchers, and project participants
- ➔ Demonstrated local public and private partnerships can achieve TMDL load reductions
- ➔ Illustrated a voluntary landowner approach can improve water quality and restore beneficial uses
- ➔ Gave landowners an opportunity to reduce pollution while maintaining their economic viability
- ➔ Followed the Idaho Agriculture Pollution Abatement Plan and NRCS Standards for BMP installation
- ➔ Installed riparian buffers on agricultural land and reduced streambank erosion on creek channels
- ➔ Addressed grazing lands, animal feed operations, fish barriers, and irrigation water management
- ➔ Improved riverine wetland habitats, prevented habitat degradation, and reduced sediment and nutrients

TMDL Case Study – The EPA asked *The Center for TMDL and Watershed Studies* at Virginia Tech University to identify watersheds from across the country that successfully developed TMDLs and TMDL implementation plans resulting in improved water quality (Virginia Tech, 2006). States nominated forty-four candidate watersheds for assessment. IDEQ nominated two watersheds, Cascade Reservoir and Medicine Lodge Creek. Both of these watersheds were included in the seventeen watersheds selected by Virginia Tech to develop detailed case studies. They identified the characteristics and approaches that facilitated successful implementation and water quality improvement. Specifically, Virginia Tech (2006) identified these factors in the Medicine Lodge project listed in the table below.

Table 5. Characteristics of Successful Implementation Factors in the Medicine Lodge Project

Virginia Tech's 2006 Case Study of Factors that Affected Implementation in the Medicine Lodge TMDL Implementation Project	An implementation plan that targeted areas in need of BMPs and specified necessary funding and potential funding sources to implement these BMPs aided TMDL implementation
	State and federal agencies working with local ranchers and landowners to improve water quality without affecting ranching operations enhanced implementation
	Cooperation between local, state, and federal agencies and local landowners aided implementation
	Early interest by local, state, and federal agencies in addressing water quality problems led to extensive inventories and monitoring and early completion of the TMDL
	The success of the TMDL implementation can be primarily attributed to the cooperation between various agencies, local ranchers, and landowners

SUPPLEMENTAL INFORMATION

Figure 3. Summary of Program Expenditures in the Medicine Lodge Creek Project

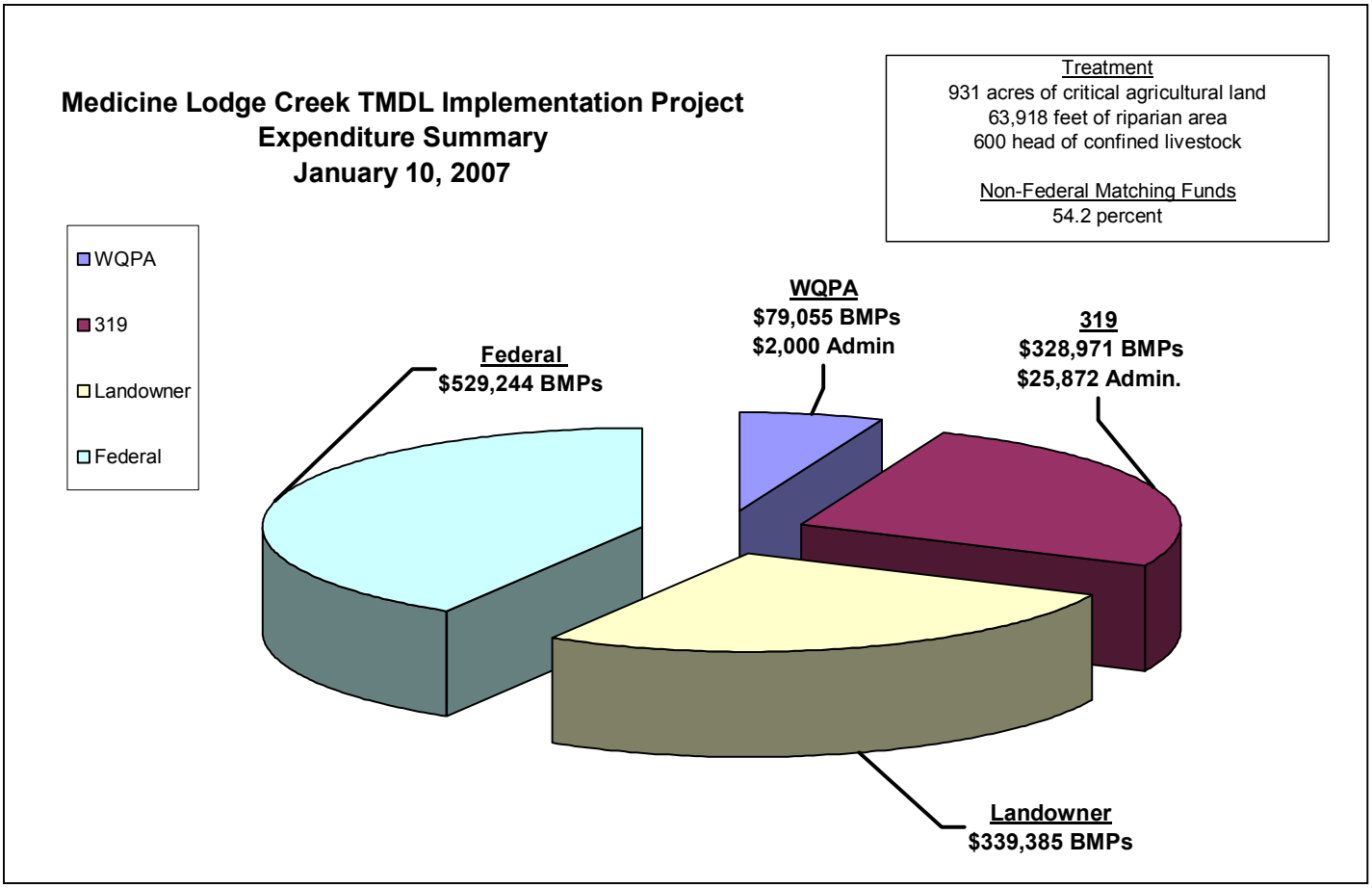


Table 6. Proposed Project Costs, Obligated Contract Funds, & Actual Expenditure Amounts

	Proposed Project $	Obligated Contract $	Actual Expenditures $
Total Cost	$810,552	$1,446,983	$1,304,527
State Match	$115,487	$82,244	$81,055
Operator Match	$209,877	$460,323	$339,385
Other Monies (§319, CCRP, EQIP)	$485,188	$904,416	$884,087

Note – All amounts include administrative and project oversight costs

BEST MANAGEMENT PRACTICES IMPLEMENTED

Summary – The project dealt with water quality problems on 27 miles of Irving, Medicine Lodge, Middle creeks. Furthermore, the project addressed resource concerns on 9,809 acres (Figure 4). This was 27% of the private land in the watershed. The project installed 12 miles of streambank protection, 931 critical acres of land treatment, and 24 miles of fencing. Resource concerns from three AFOs with 600 head of livestock and another 1,000 head of livestock were addressed with waste storage facilities, animal walkways, watering facilities, fencing, heavy use protection, and pipelines.

Figure 4. Treated Reaches and Project Areas in the Medicine Lodge Creek Project

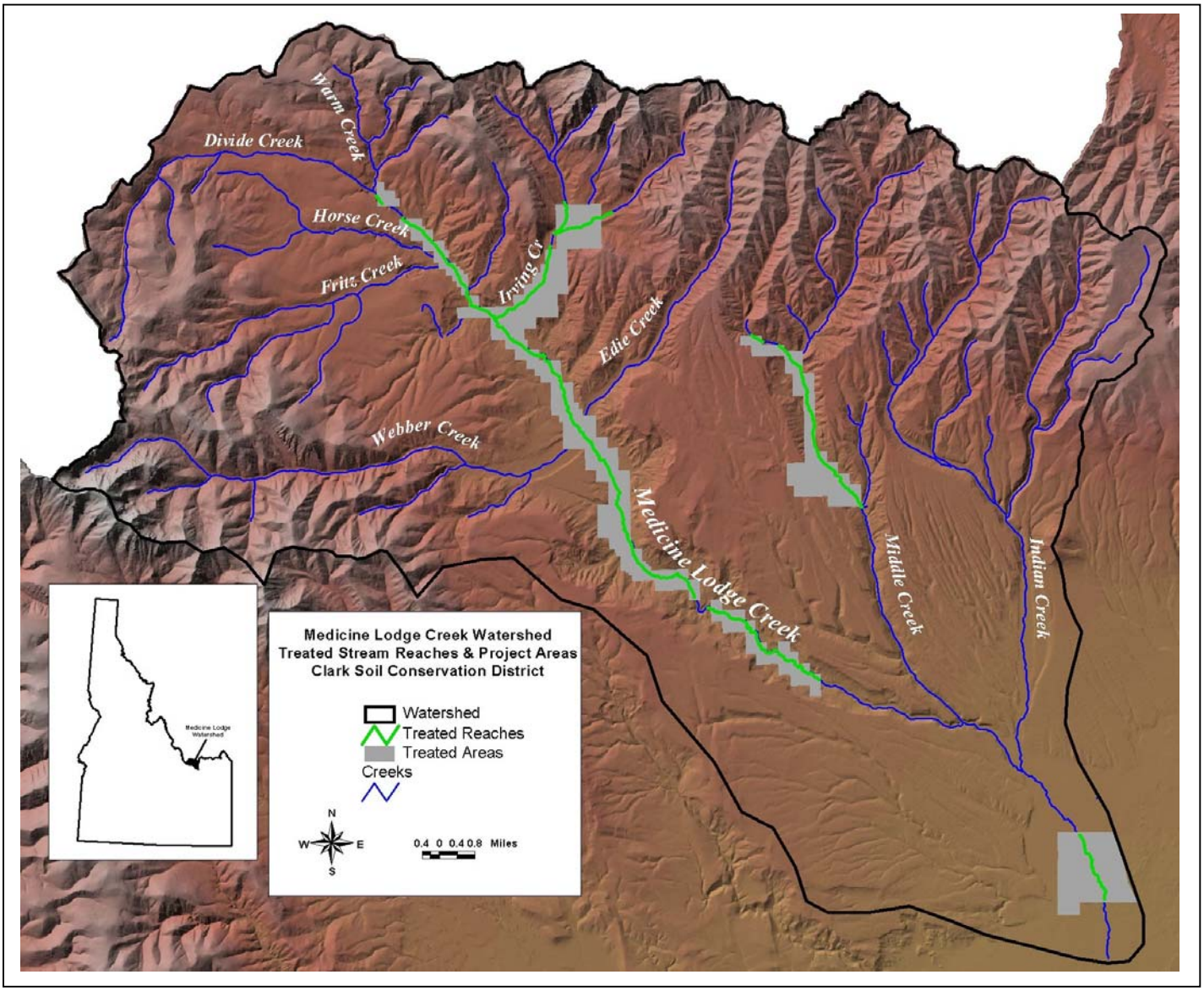


Table 7. BMP Expenditures (Total, Operator, State, Other Monies) and Installed Amounts

BMPs	AMOUNT INSTALLED	TOTAL COSTS	OPERATOR FUNDS	STATE MATCH	OTHER MONIES	ACRES TREATED	RIPARIAN (FT)	AFO (HEAD)
ANIMAL TRAILS & WALKWAYS	60 FT	$15,200	$3,800	$11,400	$0	0	0	0
DIVERSION	8 EA	$91,798	$23,231	$40,500	$28,067	0	0	0
FENCE	126,166 FT	$272,357	$36,301	$5,503	$230,553	0	14,210	250
HEAVY USE PROTECTION	12 EA	$33,400	$5,890	$0	$27,510	0	0	0
IRRIGATION PIPELINE, PLASTIC	8,450 FT	$64,880	$16,220	$0	$48,660	0	0	0
IRRIGATION SYSTEM, SPRINKLER	477 AC	$269,456	$116,291	$0	$153,165	477	0	0
PASTURE & HAYLAND PLANTING	120 AC	$4,155	$1,039	$0	$3,116	120	0	0
PEST MANAGEMENT	327 AC	$0	$0	$0	$0	327	0	0
PIPELINE, LIVESTOCK WATER	7,900 FT	$12,643	$2,801	$0	$9,842	0	0	0
RIPARIAN FOREST BUFFER	327 AC	$0	$0	$0	$0	327	31,597	0
STREAMBANK PROTECTION	18,111 FT	$416,919	$105,940	$21,653	$289,327	0	18,111	0
STRUCTURE FOR WATER CONTROL	9 EA	$31,500	$7,875	$0	$23,625	0	0	0
TREE & SHRUB ESTABLISHMENT	8,753 EA	$30,876	$3,088	$0	$27,788	0	0	0
UPLAND WILDLIFE HABITAT MGMT	306 AC	$0	$0	$0	$0	306	0	
USE EXCLUSION	327 AC	$0	$0	$0	$0	327	0	0
WASTE STORAGE FACILITY	1 EA	$29,202	$16,082	$0	$13,120	0	0	350
WATERING FACILITY	2 EA	$4,269	$827	$0	$3,442	0	0	0
MEDICINE LODGE CREEK PROJECT TOTAL		**$1,276,655**	**$339,385**	**$79,056**	**$858,215**	**931**	**63,918**	**600**

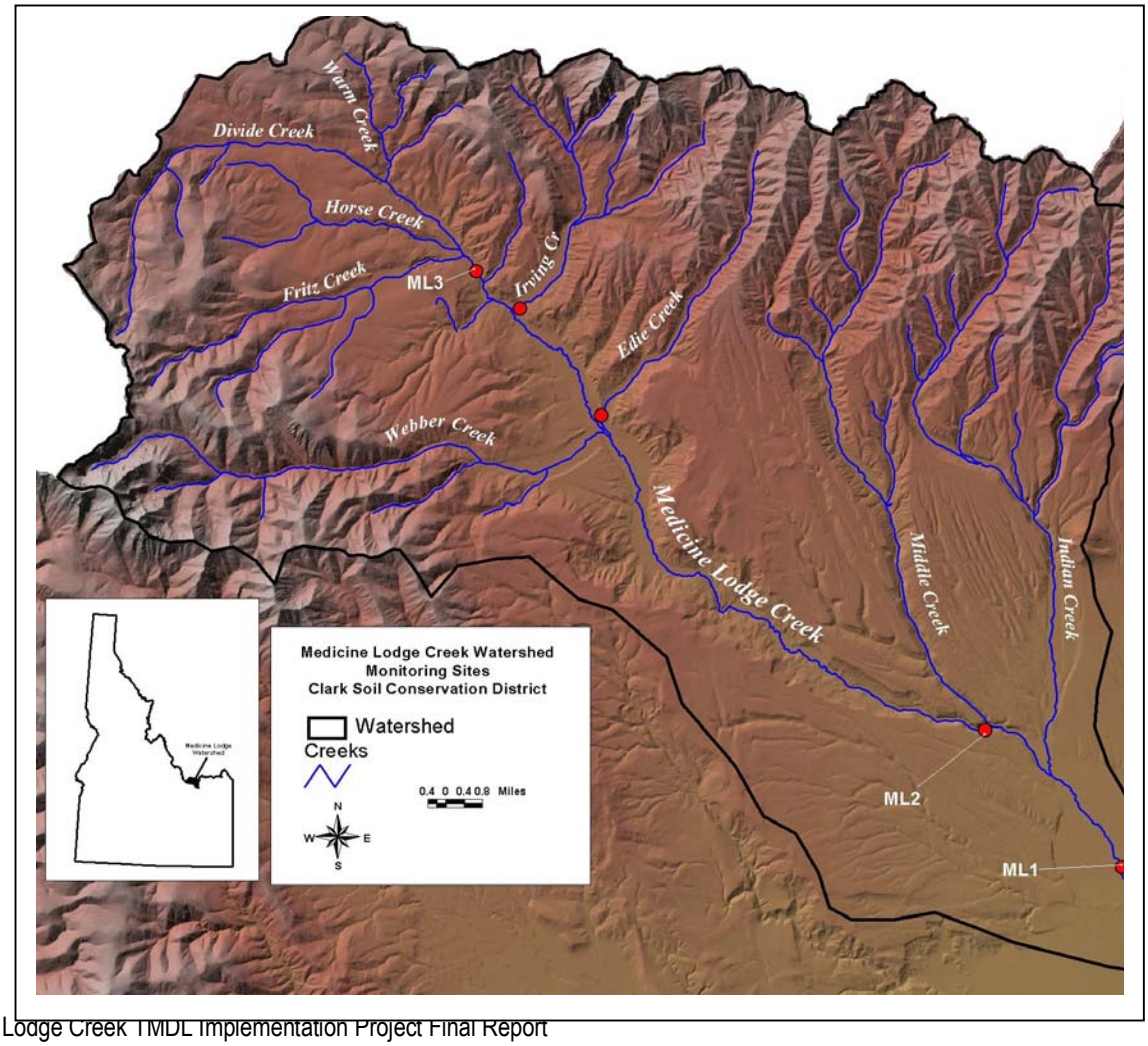
MONITORING RESULTS

TMDL Implementation Effectiveness – Evaluation and monitoring is an integral component of this project. The USDA-NRCS completed status reviews annually on all twenty-one (21) §319, EQIP, CCRP, and WQPA contracts. Additionally, BMP evaluations will be conducted in accordance with the ***Idaho's Agricultural BMPs: A Field Guide for Evaluating BMP Effectiveness (ISCC, 2006).***

Instream Monitoring – In 2005, the IASCD completed their water quality monitoring project in the Medicine Lodge watershed. Their results were published in the ***Medicine Lodge Subbasin Quality Monitoring Report, (Jenkins, 2005)***. This monitoring project concentrated on Medicine Lodge, Edie, and Irving creeks. The Clark SCD requested the monitoring to provide water quality data to identify pollutant sources and to quantify pollutant amounts. IASCD worked cooperatively with ISDA and Clark SCD.

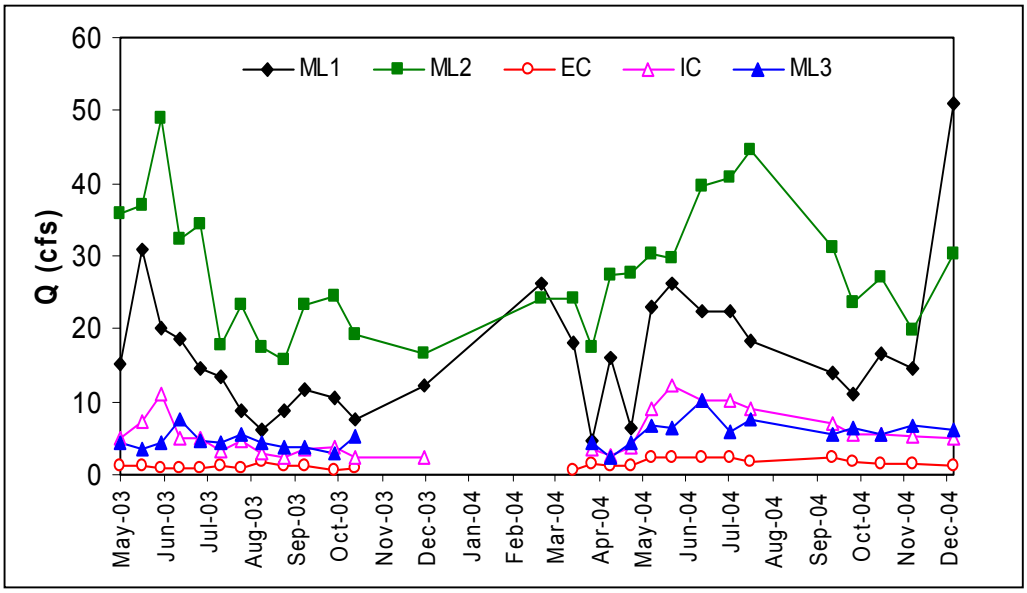
Schedule and Sites – Five sites in the watershed were monitored from May 2003 until December 2004 (Figure 5). IASCD monitored twice a month throughout most of the year and once a month during winter. Samples were collected for total suspended solids (TSS), total volatile solids, total phosphorous (TP), orthophosphorus, nitrate + nitrite and ammonia. Field measurements were taken for stream discharge, temperature, dissolved oxygen, pH and conductivity (Jenkins, 2005).

Figure 5. IASCD Monitoring Locations in the Medicine Lodge Creek Subbasin



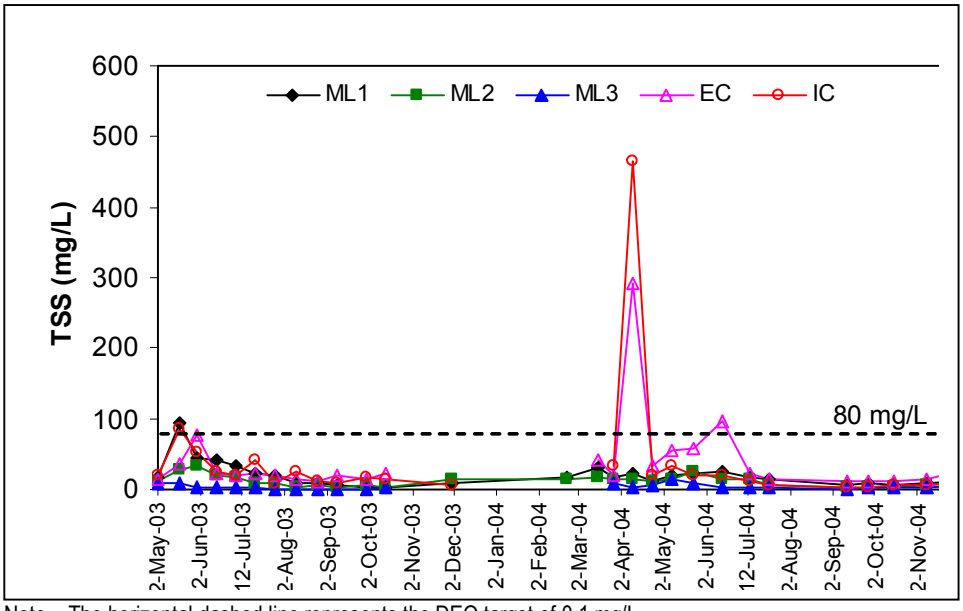
Stream Discharge – Discharge peaked in the spring and declined for the rest of the year (Figure 6). Edie Creek was the exception to this trend which remained relatively constant through the year. The ML3 site's discharge peaked in the spring of 2004, but not in 2003 (Jenkins, 2005).

Figure 6. Discharge at Five Monitoring Sites in the Medicine Lodge Creek Subbasin



Total Suspended Sediment (TSS) – TSS concentrations at each site were low. The IDEQ TSS target of 80 mg/L was exceeded only five times during this project; at the ML1, Edie and Irving sites. Suspended sediment levels increased during spring runoff events and declined to low levels throughout the rest of the year (Figure 7). While all sites met the IDEQ target, further reductions could be achieved by implementing sediment reduction BMPs on Edie and Irving creeks (Jenkins, 2005).

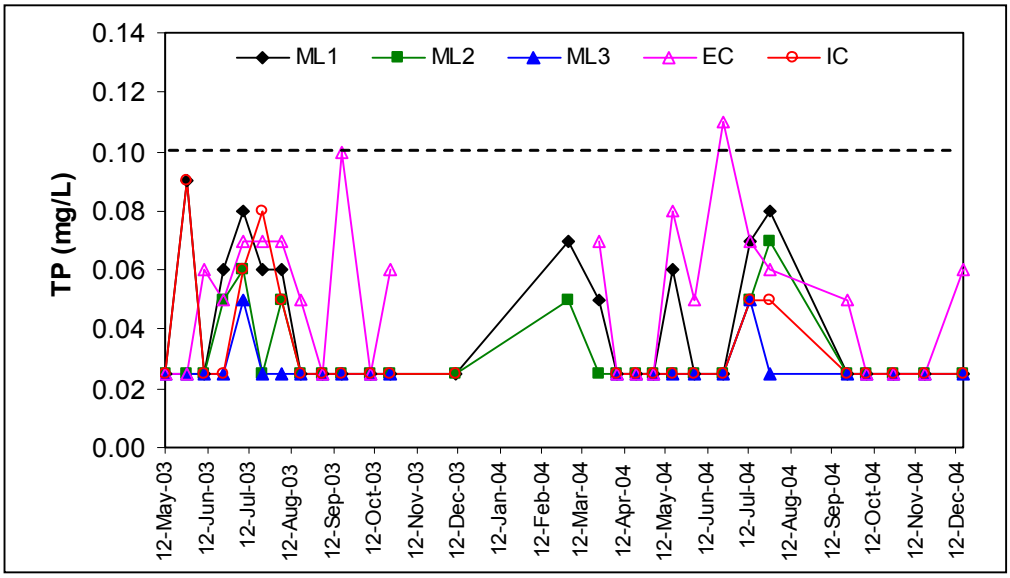
Figure 7. Total Suspended Sediment at Five Sites in the Medicine Lodge Creek Subbasin



Note – The horizontal dashed line represents the DEQ target of 0.1 mg/L.

Total Phosphorus (TP) – Overall, TP concentrations were low at all tributaries and only two samples at Edie Creek were greater than or equal to the IDEQ target of 0.1 mg/L. TP amounts at the five sites fluctuated throughout the year (Figure 8). TP levels were highest during the late spring and summer months, with the majority of high TP measurements occurring during July. On average, TP quantities at the five sites were well below the IDEQ target (Jenkins, 2005).

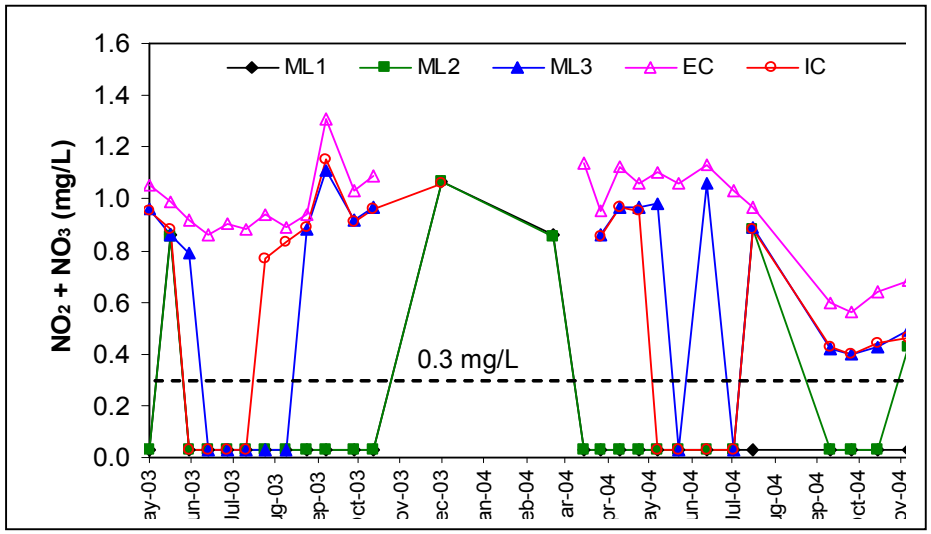
Figure 8. Total Phosphorus at Five Sites in the Medicine Lodge Creek Subbasin



Note – The horizontal dashed line represents the DEQ target of 0.1 mg/L.

Nitrogen (NO_3+NO_2) – Nitrogen concentrations at the five sites fluctuated throughout the year and were higher at the upper Medicine Lodge site and at the Edie and Irving sites than at the lower Medicine Lodge sites (Figure 9). IDEQ's target of 0.3 mg/L was exceeded occasionally at ML1 and ML2, much more at Irving and ML3 sites, and every time at the Edie site (Jenkins, 2005).

Figure 9. Nitrogen (NO_3+NO_2) at Five Sites in the Medicine Lodge Creek Subbasin

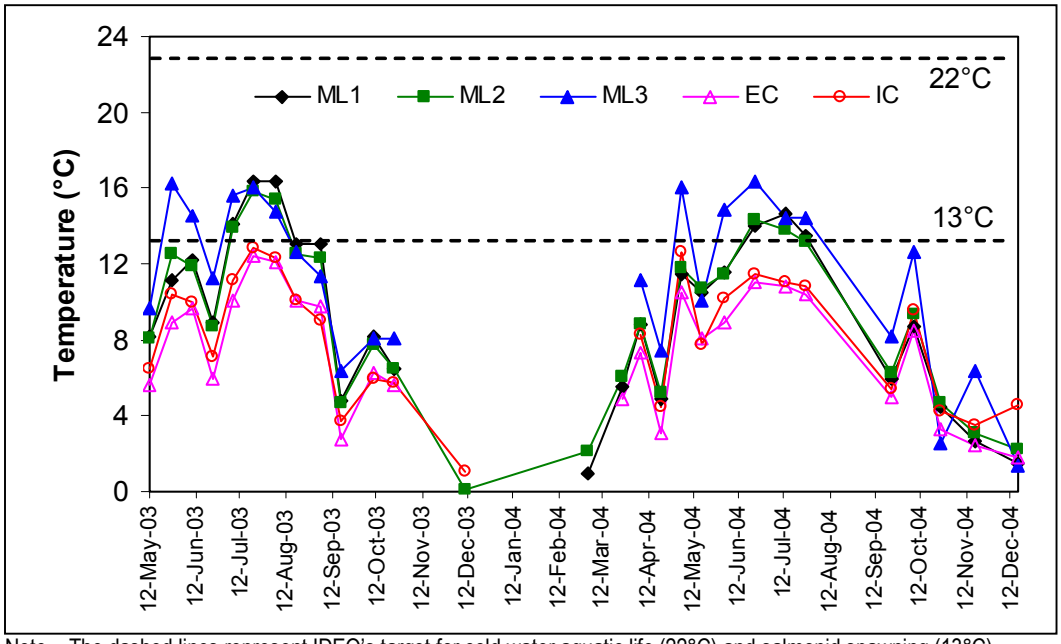


Note – The horizontal dashed line represents the IDEQ target of 0.3 mg/L.

Instream Temperature –No temperature measurements exceeded IDEQ's target for cold water aquatic life (CWAL, ≤ 22°C) during the monitoring period (Jenkins, 2005). However, there were exceedances of

the target during salmonid spawning periods in Medicine Lodge Creek (SS, ≤ 13°C), but not in Edie or Irving Creeks. Instantaneous temperatures at the five sites exhibited a seasonal pattern with the highest occurring during summer months and declining during fall and winter (Figure 10).

Figure 10. Instream Temperature (ºC) at Five Sites in the Medicine Lodge Creek Subbasin



Note – The dashed lines represent IDEQ's target for cold water aquatic life (22°C) and salmonid spawning (13°C).

Conclusions and Recommendations – This monitoring project's results indicate water quality targets are being met for TSS, TP, and temperature in Medicine Lodge, Edie, and Irving creeks. Nitrogen was the only pollutant measured that consistently exceeded IDEQ's targets (Jenkins, 2005).

TSS levels at all sites were below the IDEQ target. The lower than expected sediment amounts measured throughout this project may be the result of conservation efforts in the watershed. This project documented that TP concentrations at the five sites were below IDEQ's target. TSS and TP are often highly correlated and best management practices (BMPs) that have been implemented to reduce TSS inputs into the system may have additionally worked to reduce TP loads (Jenkins, 2005).

All sites monitored exceeded IDEQ's target for nitrogen at some point during the project. Despite the high levels, the streams appear to be functioning properly and the impact of the nitrogen is not clear. An abundance of aquatic vegetation was observed at the ML3 site, but measurements of dissolved oxygen at the site indicated that fish habitat was not impaired (Jenkins, 2005).

Ultimately, the nitrogen source is unknown, but the influence of ground water in the upper reaches of Medicine Lodge Creek, and Edie and Irving creeks may indicate how nitrogen is entering the system. Further ground water monitoring and soil sampling is necessary to determine source areas (Jenkins, 2005).

Surface Water Improvements – Overall, water quality in the three streams monitored appeared to be good. The source of elevated nitrogen should be further investigated through a review of the geology, soils and historical landuse in the subbasin (Jenkins, 2005).

Ground Water Improvements – There was no ground water monitoring performed or completed.

Other Monitoring – The IDEQ, BLM, and the FS have collected stream temperature data in the Medicine Lodge watershed. The data showed major exceedances for salmonid spawning on every stream sampled but no exceedances for cold water aquatic life (IDEQ, 2003). In total, there were four temperature sites on the listed segment of Medicine Lodge Creek in the year 2000 and all showed a major exceedance of the salmonid spawning criteria. Fritz Creek had three temperature sites in 2000, and again, they all had a major exceedance of the salmonid spawning criteria (IDEQ, 2003).

The IDEQ has been collecting water quality data to assess stream health and collecting biological samples since 1993 through BURP (IDEQ, 2003). Almost half (42%) of the streams have surface fines percentages of over 50%. There is an overall increasing trend in percentage fines in the lower section of the watershed. Indian, Webber, Irving, and Edie creeks have low surface fines percentages. Crooked Creek, the North Fork of Fritz Creek, Horse Creek and Warm Springs Creek all have high surface fines percentages although the banks appeared to be fairly stable (IDEQ, 2003).

IDEQ collected McNeil sediment core samples at 10 locations in 2000 and 11 more sites in 2001 (IDEQ, 2003). The majority of the streams in the watershed do not meet the IDEQ's target of 28% or less of fine particles less than 6.35 mm. Medicine Lodge Creek at Small was not much above the target while the mid-section of the creek had the highest with 66% greater than the target (IDEQ, 2003).

Cold water species dominate the Medicine Lodge subbasin (IDEQ, 2003). Electro-fishing data were collected by the IDEQ, BLM, USFS and the IDFG. All of the streams in the subbasin are considered to meet the beneficial use of Cold Water Aquatic Life, and seven streams have designated beneficial uses including Salmonid Spawning (IDEQ, 2003).

Sampling and Analysis Plan – The IASCD and Clark SCD created their monitoring project plan which described what would be sampled and analyzed in the watershed. The purpose of the monitoring was to help identify where agricultural related pollutant sources are coming from and determine the effectiveness of BMP installed on agricultural lands (Fischer, 2003).

BMP Operation and Maintenance – After contracted BMPs were installed, their operation and maintenance was checked by the NRCS during annual status reviews during the contract period. If a deficiency was found, then NRCS informed the Clark SCD, ISCC, or FSA which then issued a letter to the participant to correct the situation or refund any funds in accordance with their contract.

BMP Effectiveness Evaluations – BMP effectiveness monitoring will be conducted to determine how the BMP is installed, operated and maintained. Conservation planning establishes a benchmark for the resource concerns using several methods, including RUSLE, SISL, Alutin method, Direct Volume, SVAP, SECI, PFC, cross sections, CAFO/AFO assessment, OnePlan, WinPST. These same tools are used to determine effectiveness and associated pollutant reduction. BMP effectiveness monitoring and field evaluations of progress will be conducted by IASCD, ISCC and ISDA personnel.

COORDINATION EFFORTS

Summary – This project included coordination from several people, agencies, and organizations. Specifically, the cooperative nature of the residents, ranchers, and landowners was the key to success. Their collaborative spirit brought together numerous private, local, state, and federal partners.

State Agencies – Listed below are the numerous agencies involved with this project.

ISCC – The Idaho Soil Conservation Commission provided technical and financial assistance to the project for the TMDL agricultural implementation plan and project.

IDEQ – The Idaho Department of Environmental Quality provided assistance to the project for TMDL planning and implementation, water quality certification (§401), watershed advisory group, and nonpoint source (§319) program activities.

IASCD – The Idaho Association Soil Conservation Districts provided technical assistance to the project for the TMDL agricultural implementation plan and project.

ISDA – The Idaho State Department of Agriculture provided technical assistance to the project for AFO inspections, waste storage facilities, nutrient management, and irrigation system engineering design.

IDWR – The Idaho Department of Water Resources provided technical assistance to the project for stream channel alteration permits, instream stockwater, and water right transfers.

IDFG – The Idaho Department of Fish and Game provided technical assistance to the project for stream alteration permits.

SHPO – Idaho's State Historical Preservation Office ensures that federal agencies consult with the SHPO as required by the National Historic Preservation Act. SHPO reviewed the proposed projects by assisting in the recognition and protection of sites, buildings, and structures that are important to Idaho's past.

Federal Coordination – There were several federal agencies involved in the project and listed below.

USDA-NRCS – The Natural Resources Conservation Service provided technical and financial assistance to the project for the TMDL agricultural implementation plan and project.

USDA-FSA – The Farm Service Agency provided financial assistance to the project for the TMDL agricultural implementation plan and project.

USEPA – The Environmental Protection Agency provided financial assistance for the TMDL implementation project.

USACOE – The Corps of Engineers provided technical assistance to the project for the §404 permits.

USDI-BLM – The Bureau of Land Management provided technical assistance to the project for the TMDL agricultural implementation plan and project.

CTNF – The Caribou-Targhee National Forest provided access for tree/shrub sources and bioengineering materials.

USDA Programs – The Clark SCD mainly used the Continuous signup Conservation Reserve Program (CCRP) and the Environmental Quality Incentives Program (EQIP). Neither of these programs could be used for match with Idaho's Nonpoint Source Program (§319). Therefore, the Clark SCD integrated all of these programs to increase participant satisfaction and to ensure success. Along with CCRP and EQIP, other USDA programs used included Conservation Technical Assistance (CTA), Technical Service Providers (TSP), and the Conservation Reserve Program (CRP).

Accomplishments of Agency Coordination Meetings – The project's coordination activities were performed during the Clark SCD's regular monthly meetings, the Continental Divide WAG meetings, and on-site inventory, assessment, inspection, and construction activities.

Resources/Coordination from Federal Land Management Agencies – The Bureau of Land Management and the Caribou-Targhee National Forest coordinated with the Clark SCD and the Continental WAG throughout the project.

Other Sources of Funds – The largest portion of the project's other funds ($340,000 or 26% of the total cost) was provided by private landowners and ranchers. Idaho's Water Quality Program for Agriculture provided $81,000 or about 6% of the project cost. Additionally, the State of Idaho provided in-kind match of more than $45,000 for employees' time throughout the project's phases.

SUMMARY OF PUBLIC PARTICIPATION

The Clark SCD held their regularly monthly meetings in accordance with Idaho's Open Meeting Law *(I.C. §67-2340)*. Additionally the Continental WAG held their meetings throughout the project period.

Figure 11. Participants visit at one of the project sites during the Clark SCD's tour in September 2002.

Initial watershed meetings were held in 1999 with the Clark SCD, Continental WAG, IASCD, and IDEQ. The Clark SCD hosted a project tour in 2002 and visited the project sites with IDEQ, NRCS,

and ISCC on several occasions to review progress. The Clark SCD created project newsletters, poster displays, and progress reports.

The spirit of cooperation amongst the ranchers in the Medicine Lodge area was apparent throughout the project. Their positive attitudes and proactive approaches resulted in awesome participation during the project. Additionally, the project's success depended heavily on convincing ranchers and landowners that local, state, and federal agencies would work with them to improve water quality without negatively impacting their ranching operations (IDEQ, 2003).

Figure 12. Senator Don Burtenshaw (R-Terreton) talks with Clark SCD Supervisors Bill Fredericksen, Tod Shenton, Howard Fredericksen, and rancher Lynn Hoggan, during the Clark SCD tour in 2002.

ASPECTS OF THE PROJECT THAT DID NOT WORK WELL

The overall opinion was that everything worked really well. Since the project's inception, many changes occurred which improved effectiveness. There were challenges encountered during the project.

In 2003, a large wildfire in the watershed caused a reassessment of the burned riparian areas and changed some planned BMPs to reduce sediment erosion on those burned areas. The technology with computers hardware and software, digital cameras, remote sensing products (i.e. aerial photos), and bioengineering changed significantly throughout the project. Original BMP prescriptions were overestimated. Because use exclusion caused a faster recovery on most eroding areas, several structural BMPs were revised or in some cases no longer necessary to stabilize the creeks.

A major challenge during the project was employee turnover. Several employees with Clark SCD, IDEQ, IASCD, and NRCS accepted other jobs and were replaced during the project. This put more responsibility onto the Clark SCD and NRCS to provide leadership which ensured the project's success. Although employee turnover slowed progress, new people brought energy and enthusiasm. Also organizational transition played a big role with more responsibilities given to agencies while they struggled to provide assistance to this project. Several people have said, ''They will miss this project.''

Figure 13. Elliot Traher (IASCD), Lloyd Bradshaw and Jack Miller (NRCS) assess the burned riparian areas along Medicine Lodge Creek in 2003.

FUTURE ACTIVITY RECOMMENDATIONS

Important future actions should include BMP effectiveness evaluation, post-project water sampling, beneficial use assessment, and noxious weed management. There are some ongoing projects which are being implemented to address livestock watering facilities and to control noxious weeds. Because of the large amount of fenced riparian areas along the creeks, weed control will be necessary for several years to increase plant diversity and to stabilize eroding stream channels.

Since 2000, the Clark SCD, Continental Divide Coordinated Weed Management Area (CWMA), and High Country RC&D have worked to control Spotted knapweed (*Centaurea maculosa*), and Leafy spurge (*Euphorbia esula*) in the watershed. In 2003 and 2004, sheep were used along Medicine Lodge Sinks to reduce seed production and canopy cover of Leafy spurge. Additionally, they have also spent approximately $2,000 annually to release bugs. These included brown dot leafy spurge flea beetle (*Aphthona cyparissiae*); black leafy spurge flea beetle (*Aphthona czwalinae*); sulfur knapweed root moth (*Agapeta zoegana*); lesser knapweed flower weevil (*Larinus minutus*); blunt knapweed flower weevil (*Larinus obtusus*); and knapweed root weevil (*Cyphocleonus achates*).

Figure 14. Denise Adkins (NRCS) checks an infestation of Leafy spurge along Medicine Lodge Creek.

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PHOTO APPENDIX

Photo 1. A dust devil moves across the hills after the 2003 fire in the Medicine Lodge Creek watershed.

Photo 3. A project site on Irving Creek before and after installing fencing, bank

Photo 4. Another project site on Medicine Lodge Creek before and during installing tree revetments, and willow plantings.

Photo 5. Another project site on Irving Creek before and after installing bank protection and willow plantings.